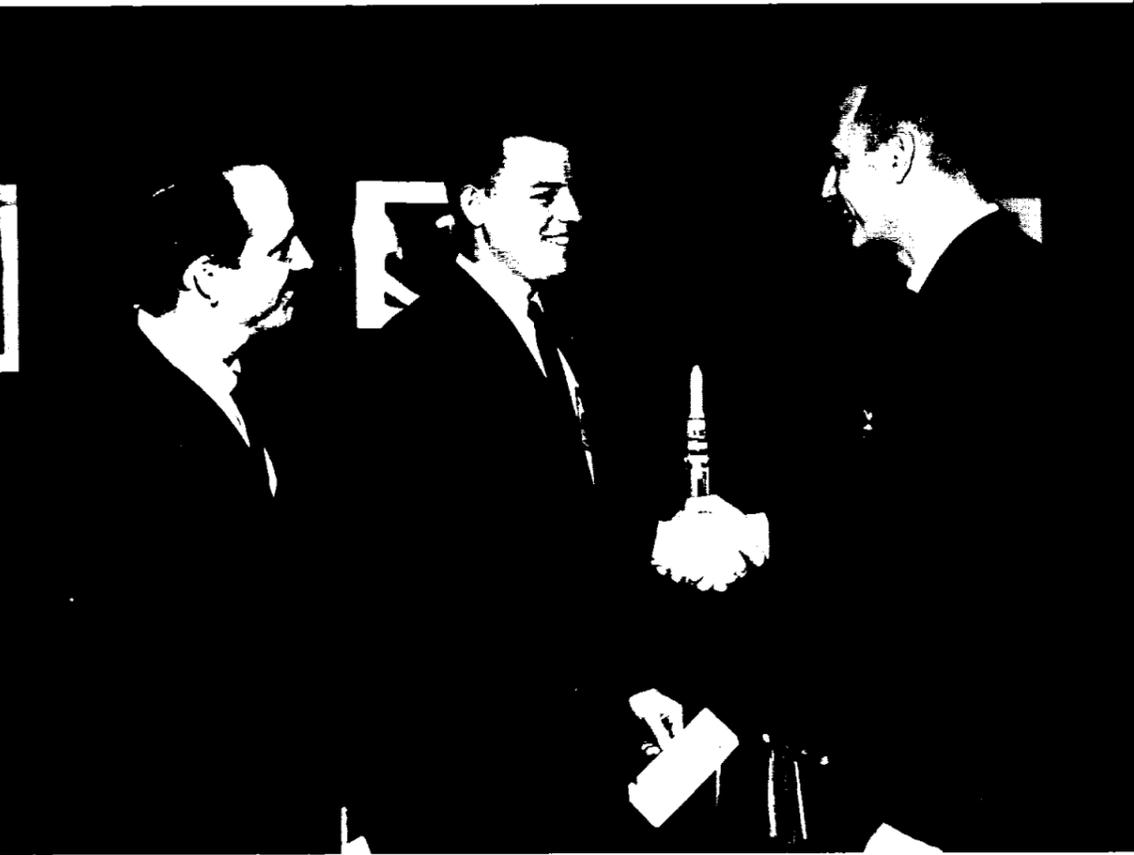


Invent New Space Headgear



CASH FOR INVENTION—Dr. Robert Jones and James O'Kane are congratulated by then MSC Deputy Director George M. Low for having won an \$1800 Invention Award resulting from their collaboration in development of the Apollo space helmet. The helmet, with a polycarbonated shell and foam insert, allows 90% more visibility than earlier Apollo helmet configurations, and is lighter, more durable and easier to don and doff. Dr. Jones is in the Neurophysiology and Biodynamics Branch of the Biomedical Research Office, and O'Kane is in the Apollo Support Branch of Crew Systems. Since this photo was taken, Low was named Apollo Spacecraft Program Office manager.

ROUNDUP

NASA MANNED SPACECRAFT CENTER

HOUSTON, TEXAS



VOL. 6, NO. 15

MAY 12, 1967

PROCEEDS TO WHITE MEMORIAL CENTER—

Shepard Flight Sixth Anniversary Marked by EV Press Club Dinner

The sixth anniversary of the flight of the first American into space was observed May 5 when the Escape Velocity Press Club held a testimonial dinner for Alan B. Shepard, pilot of the Mercury suborbital MR-3 mission.

The dinner had a dual purpose: to honor Shepard and to benefit the Edward H. White II Memorial Youth Center in Seabrook. More than \$1000 was raised by the dinner, and McDonnell Aircraft Company and Grumman Aircraft Engineering Company each contributed checks for \$1000 to the Youth Center Fund. North American Aviation pledged to furnish gymnasium equipment to the Center.



EV Press Club president John "Shorty" Powers opened the program with the introduction of the master of ceremonies, Walter M. Schirra, Jr. Schirra read several congratulatory telegrams sent to Shepard from President Lyndon B. Johnson, Vice President Hubert H. Humphrey, NASA Administrator James Webb and other national figures.

MSC Director Dr. Robert R. Gilruth reminisced on the days and weeks leading up to Shepard's flight, the successes and the setbacks, and the problems of getting the first manned spaceflight off the ground.

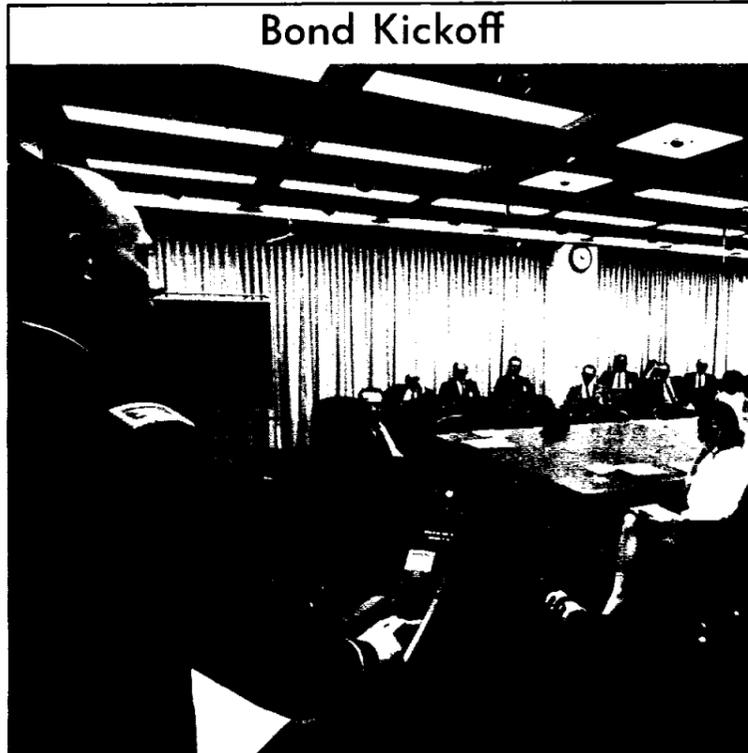
Dr. Gilruth's remarks were followed by a brief talk by NASA Marshall Space Flight Center Director Dr. Wernher von Braun, and a presentation to Shepard of a life membership in the EV Press Club by Vice President Jim Schefter.

The program gathered levity as the evening wore on. A vocal group calling itself the Fearsome Foursome parodied two Broadway numbers with lyrics rewritten for Shepard's benefit. The Foursome was made up of Richard Gordon, Charles Conrad, John Young and Tom Stafford.

A "This-Is-Your-Life" type motion picture was shown to the group of 300 persons attending

the dinner. The film was a cleverly edited montage of actual Shepard flight footage and early experimental aviation scenes which usually ended with the

(Continued on page 2)



GETTING THE WORD—Army Maj. Roger H. C. Donlon, first to receive the Congressional Medal of Honor in the Viet Nam war, tells representatives of MSC organizations how money invested in US Savings Bonds helps in the fight against Communism. Major Donlon visited MSC May 4 as part of the government-wide Savings Bond campaign which runs May 1 through June 16. MSC's goal is 80 percent participation.

Webb Names Crew For Manned Apollo

NASA Administrator James E. Webb Tuesday told the Senate Space Committee that the first manned Apollo mission would be in the first quarter of 1968 and that the prime crew would be Walter M. Schirra, Jr., Walter Cunningham and Donn F. Eisele.

The crew had been backup crew for the Apollo 204 mission which was to have been the first manned Apollo mission. Prime

Apollo 204 crewmen Virgil I. Grissom, Edward H. White II and Roger B. Chaffee were killed in a January 27 spacecraft fire during a pad test.

Webb told the senators that NASA has "developed a plan under which the first man-rated Apollo Block II spacecraft will be delivered to Cape Kennedy late this year and launched three months later."

He also noted that Schirra would be the first pilot to have flown three generations of spacecraft — Mercury, Gemini and Apollo. Schirra was pilot of the MA-8 third manned orbital Mercury mission and command pilot of Gemini VI. With pilot Thomas P. Stafford, Schirra accomplished the world's first rendezvous in space by overtaking Frank Borman and James Lovell in their 14-day Gemini VII mission.

Cunningham and Eisele have not as yet flown a mission.

In other statements to the Committee, Webb outlined design changes in the Apollo spacecraft. "In oxygen piping, stainless steel will replace aluminum lines that previously were joined with solder," he said. "For fluid lines, aluminum will be retained, with special protection for soldered joints in from 15 to 20 of the most vulnerable locations."

"Improved methods of assuring strength of soldered and mechanical joints will be introduced, and wiring runs will be shortened and protected," said Webb. Other design changes include substitution of a single-piece side hatch with pyrotechnic piston actuation for the former two-piece hatch.

Webb outlined Apollo program contractor responsibilities to the Committee. North American Aviation will be responsible for manufacture, test and delivery of the standardized Apollo Block II spacecraft, and NASA will negotiate with the Boeing Company "to extend Boeing's present contract responsibility for the integration of the first, second and third stages of the Saturn V to include also the integration into this system of the Apollo Command and Service Modules and the Lunar Module."

Additionally, Webb said that a third contractor would be selected to modify Apollo spacecraft for Apollo Applications missions.

Looking ahead to the lunar landing, Webb said. "Under our plan, the eleventh of the 15 Saturn V flights in the program will take place toward the end of calendar year 1969. If the lunar landing can be accomplished on that flight, or an earlier one, the landing will be made in this decade and the total cost up to that point will be within the \$22.7 billion estimate of runout

(Continued on page 8)

MSC Awards Contract for Two Maneuver Units

MSC awarded May 3 a \$405,000 contract to Rocket Research Corporation, Seattle, Washington, for two-hand held maneuvering units for use in extravehicular activity during future manned spaceflight missions.

The contract calls for delivery of two units and two extra propellant tanks.

The EVA units are patterned after the hand-held maneuvering unit developed at MSC and used during Gemini IV, the nation's first manned EVA activity, May 1965. The units to be developed by Rocket Research will be flight qualified, although no definitive flight assignment has yet been assigned for use of this equipment.

The Rocket Research EVA unit will have a 250 P-S (pound second) capability which will give a crewman a fair amount of maneuvering ability. The propellant will be a hydrazine mixture and the device will be designed to permit a pilot to change propellant tanks during EVA flight. The Gemini IV unit had the capability of only 50 P-S (pound second).

It is proposed that pilots will use the device in future flights to maneuver from one point to another during EVA.

The contract calls for delivery of the two units and two extra propellant tanks by February 1968.

Tops in MSC Basketball Circuit



LEAGUE CHAMPS—The Flight Control Division basketball team placed first in the American Division and won the League playoffs. Front row, left to right, are: Bert Davila, Marvin Smith, Don Sellers, Gary Renick, Jack Knight and Lutrelle Long. Back row: Coach Bill Fretwell, Elmer Brooks, Bob Britton, Tandy Bruce and Dave Lund. Not in photo: Terry Neal.



NATIONAL CHAMPS—The IBM team was in first place in the National Division at the end of the season. Front row, left to right, are: Ron Deiderich, Bill Cale, Bill Williams, Pete Pampolina and Chuck Michalik. Back row: Jimmy Cypert, Billy Crisp, John Moore, Will Taylor, Terry Anderson and Gerry Ebker. Not in photo: Terry Smith.



LEAGUE RUNNERS-UP—Runner-up team in the League playoffs was the Mission Planning and Analysis Team. Front row, left to right, are: Tommy Keeton, Richard Kruse, Bob Regelbrugge and Bob Wiley. Back row: Ken Young, Larry Armstrong, Larry Ratcliff and Gene Ricks. Not in photo: Dave Alexander and Bob Johnson.

Boeing Gets \$1.9 Million Orbiter II Incentive Fee

The NASA Lunar Orbiter Incentive Evaluation Board gave the Boeing Co., Seattle, a net award of \$1,918,725 for the Lunar Orbiter II mission.

The Lunar Orbiter incentive contract between NASA and Boeing, the prime contractor, contains provisions under which the contractor could incur a fee reduction for late delivery of Orbiter spacecraft, and earn a reward on the basis of photographic data returned by the mission.

Prime objective of the Lunar Orbiter II mission was to obtain from lunar orbit detailed photographic information of various lunar areas to assess their suitability as landing sites for Apollo and Surveyor spacecraft and to

improve US scientific knowledge of the moon.

The performance award was based on the usefulness of the photographic data returned in meeting those objectives. It was the decision of the board that the mission results merited the maximum possible award.

On its photographic mission, Lunar Orbiter II returned high quality photographic data of 14,000 square miles of 13 separate candidate Apollo areas. Approximately 98 per cent of the planned prime site photography was obtained. An equipment failure late in the mission resulted in the loss of 2 per cent of these data.

In addition to the prime Apollo support information, however, Lunar Orbiter II took a number of secondary photographs including two million square miles of the hidden side of the moon. These secondary photographs have contributed significantly to an increase in scientific understanding of the moon.

It was the opinion of the Board that the usefulness of the bonus secondary photographs compensated for the minor losses in quantity and quality of the prime photography and the full performance award was warranted.

Straight Talk from your Credit Union

Nine curious facts about your MSC Federal Credit Union . . .

- Your credit Union is run for your benefit—and that's the honest truth. Each member is a part owner. It's like owning your own store.

- When you need to borrow money, your Credit Union is the most convenient and truly helpful place to go. Remember, you own it!

- Also, nobody creams off any profits in the Credit Union. There are no stockholders. Instead, the net earnings are divided up among members.

- The elected directors and committeemen even have to work without pay, usually on their own time. Only the office employees can be paid.

- Which explains why the returns on your savings are so good compared with other places which accept savings. In your non-profit Credit Union the members receive all the earnings money.

- Your Credit Union is the cheapest place to get credit in most cases. Few lenders can match the Credit Union's non-profit interest on loans.

- The Credit Union isn't even a business, as some people may think. A credit union is the kind of saving and borrowing service which a group of people are allowed by law to set up for their own benefit. It is a non-profit membership corporation, with a charter from the state of federal government.

- Now do you see why your membership group started this Credit Union? Wherever money is concerned, its only purpose is to give you a better deal than you can get anywhere else. If it does that, it is well worth the trouble of running it.

- What counts about interest? The total interest cost to you is what counts! Forget such words as six percent, four percent, add-on . . . and come see the people at your MSC Federal Credit Union, where you'll get straight talk instead of double talk.

Shepard

(Continued from page 1)

aircraft reduced to a pile of splinters.

The program concluded with an acknowledgement by Shepard and an overview as to where the manned spaceflight program is headed.

The Escape Velocity Press Club is made up of newsmen covering MSC activities. The dinner was held at the Nassau Bay Motor Hotel.

Co-op of Month



POWERHOUSE — Arlington State College electrical engineering junior Dan S. Trent works in the Power Generation Branch of Propulsion and Power Division where he has participated in preliminary design studies for Apollo Applications electrical power system, and has operated a Branch test laboratory in tests of battery systems and acceptance tests of a SNAP-11 radioisotope thermoelectric generator.

Lunar Orbiter IV Begins Mapping Moon Surface in Near-Polar Orbit

After some delay in verifying a valve in the Agena stage, Lunar Orbiter IV lifted off at 5:25 pm CDT May 4 on its way to begin an extensive lunar mapping project. Systematic photo-mapping from a near-polar orbit around the moon was scheduled to begin yesterday, and will include coverage of about 90 percent of the moon's backside.

Lunar Orbiter spacecraft are flown to continue the efforts made with Ranger and Surveyor flights to acquire knowledge of the moon's surface. The first three Lunar Orbiter missions were in direct support of the Apollo and Surveyor lunar landing programs; they identified eight areas in which potential manned landing locations exist.

The fourth Orbiter mission is a broad photographic survey of the entire front side of the moon, with additional photography of hidden side areas scheduled as well.

The 860-pound Orbiter was launched by an Atlas-Agena D vehicle from Cape Kennedy, Fla., on a flight to the vicinity of the moon which took about 89 hours. Successfully injected on its translunar trajectory, it was designated Lunar Orbiter IV.

Landing Site Photos

The broad, systematic survey of lunar surface features is designed to increase scientific knowledge of the nature and origin of the moon and of the processes by which its surface was formed and modified. The survey will supply the basis for planning and selecting sites for detailed scientific study by later orbital and landing missions.

It is expected that more than 80 percent of the front face of the moon will be photographed in sufficient resolution to show surface features as small as 200 feet across. The pictures will be about 10 times more detailed than the best earth-based photographs made through telescopes. In addition, photographs of the moon's polar regions at lesser resolution will complete coverage of the full front face.

Photography on the hidden side of the moon will provide pictures of objects 400 feet and larger, and will fill out the coverage begun by Lunar Orbiters I, II, and III. It is planned to cover more than 90 percent of the hidden side.

Lunar Orbiter IV's photographic survey will be accomplished from a relatively high, nearly polar orbit around the moon. The intended perilune of the orbit will be about 1,650 miles and the apolune about 3,800 miles. The spacecraft

requires 12 hours to complete one revolution of the moon at those altitudes.

Busy Flight Plan

The photographic flight plan is an ambitious one which assumes that all spacecraft systems, ground support systems, and the operations team will be able to operate at maximum efficiency. Once photography began there were picture-taking sequences on every orbit. It is planned that the pictures will be processed and read back to earth receiving stations during the picture-taking phase although a complete final readout will be performed if required. The 12-hour orbital period permits this mode of operation.

The full photographic flight plan requires more than 200 camera-pointing maneuvers by Orbiter IV where only 50 were required for the Lunar Orbiter III photographic flight plan.

In addition to its assignment of surveying the moon photographically, Lunar Orbiter IV, like its predecessor, will monitor proton radiation and meteoroids in the vicinity of the moon. The detection equipment on the three Orbiter spacecraft flown thus far have counted a total of five meteoroid punctures.

The most notable radiation measurements were recorded by Lunar Orbiter I which clearly measured the effects of a series of solar flares which took place after its photography was complete.

Meteoroid and radiation measurements are used primarily for spacecraft performance analysis since the hermetically-sealed camera package potentially could suffer damage from meteoroid hit or the photographic film could fog from solar proton radiation.

Helps Measure Gravitation

Orbiter IV, like its three predecessors, will add to and refine the definition of the moon's gravitational field, although the higher orbital inclination and greater distance from the moon will produce much smaller changes in orbit due to gravitational irregularities.

On the first day of the launch period, May 4, Orbiter's launch window was between 3:57 pm CDT and 7:10 pm CDT. On each succeeding day of the period, the window would have opened a few minutes earlier.

During its journey to the moon, the spacecraft was oriented to the sun and the southern hemisphere star Canopus, except when it was executing mid-course maneuvers.

A fairly large first midcourse maneuver was required even assuming launch vehicle performance is as accurate as that achieved on the first three spacecraft of the series. This is because launch vehicle targeting was developed for a mission similar to Lunar Orbiter III.

At a point ranging about 2,350 miles from the moon's surface, the liquid fuel retroengine fired to slow the spacecraft to allow

capture by the moon's gravitational field. As a satellite of the moon, Lunar Orbiter will enter an initial elliptical orbit whose distance from the moon will vary between 1,650 and 3,800 miles.

Near-Polar Orbit

The high-altitude, high-inclination orbit (85°), markedly different from the flight paths of the first three spacecraft in the series, is necessary to permit the broad photographic survey of the moon which is Lunar Orbiter IV's principal assignment.

Photography was scheduled to begin yesterday and will be completed about May 28.

The relatively long orbital period—about 12 hours—and the fact that the spacecraft will only rarely disappear behind the moon on its elliptical flight path, make possible to read back Lunar Orbiter IV photographs on each orbit as they are taken and processed.

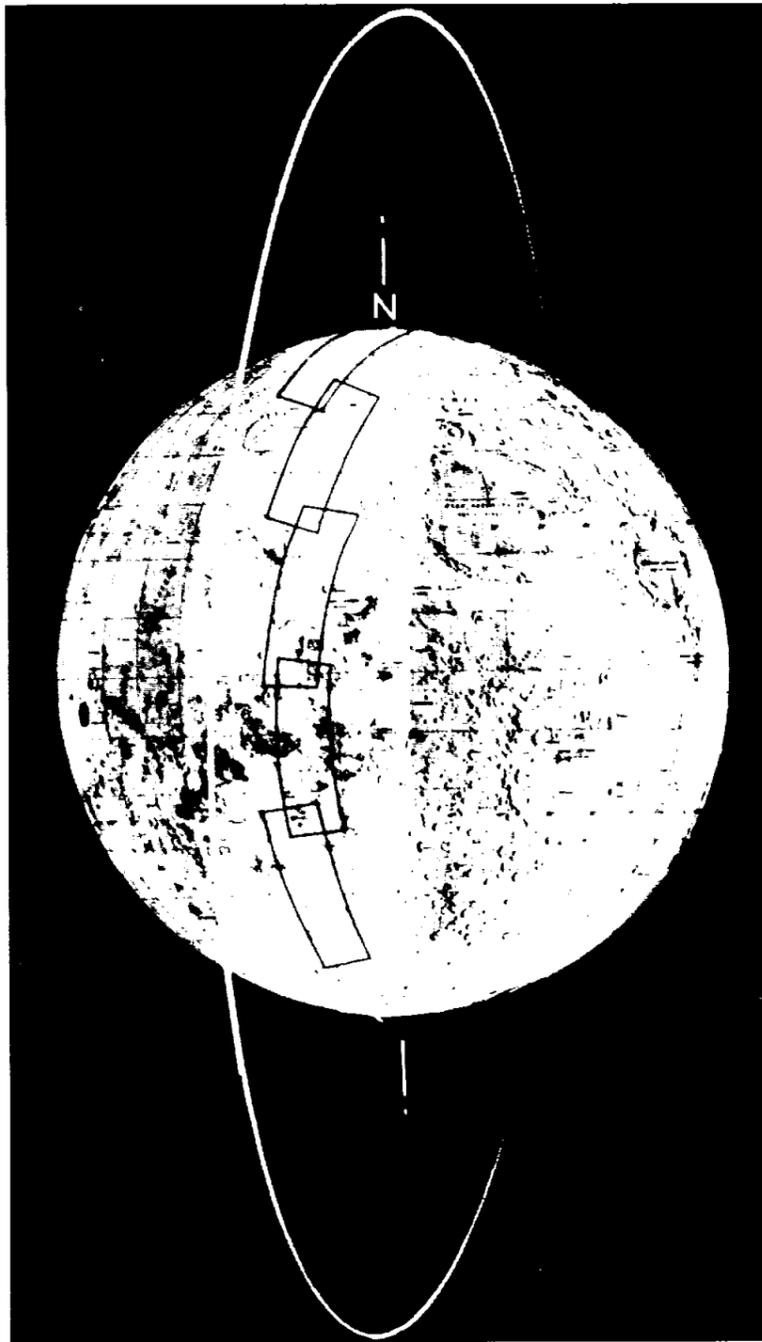
NASA will distribute lunar site photographs to members of the scientific community for interpretive studies. The U.S. Geological Survey will employ Lunar Orbiter photographs as basic material in its efforts to derive a more detailed understanding of the physical processes which played a part in the formation of the lunar surface as it exists today.

The Lunar Orbiter program is directed by NASA's Office of Space Science and Applications. The project is managed by the agency's Langley Research Center, Hampton, Va. The spacecraft are built and operated by the Boeing Co., Seattle, as prime contractor. Eastman Kodak Co., Rochester, N.Y., (camera system) and Radio Corporation of America, Camden, N.J., (power and communication systems) are the principal subcontractors to Boeing.

NASA's Lewis Research Center, Cleveland, is responsible for the launch vehicle and the Kennedy Space Center, Fla., will supervise the launch operation. Prime vehicle contractors are General Dynamics, Convair Division, San Diego, for the Atlas and Lockheed Missiles and Space Co., Sunnyvale, Cal., for the Agena.

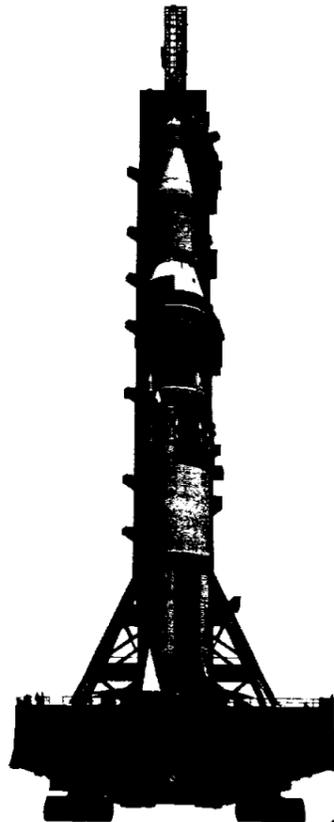
Tracking and communications for the Lunar Orbiter program are the responsibility of the NASA Deep Space Network (DSN), operated by the Jet Propulsion Laboratory, Pasadena, Cal. DSN stations, located at Goldstone, Cal.; Madrid, Spain; and Woomera, Australia, are participating in the mission.

Photographic data gathered by Lunar Orbiter's fourth mission will flow from each DSN station to the Army Map Service, Washington, D.C., for reassembly and duplication. Some material will be reassembled and printed at NASA's Space Flight Operations Facility and at the Langley Research Center to support the selection of scientific sites under consideration as photographic targets for the fifth Orbiter mission.



CLEAN SWEEP—Lunar Orbiter IV's near-polar (85° inclination) orbit will permit photography of almost all the lunar surface. Rectangles indicate individual photo frames covering areas 135x550 miles, upon which object: 200 feet across will be visible. Lunar rotation during each 12-hour Orbiter IV orbit will permit a new band of rectangles to be photographed under proper lighting conditions. The 1,660 by 3,800-mile orbit permits tracking and data readouts from DSN stations during most of each orbit.

understand, v.t.



To get or perceive the meaning of; To know thoroughly; grasp or perceive clearly and fully the nature, character, function . . . To be informed.

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Pioneers VI and VII Gather Data on Earth Magnetosphere, Solar Wind

Some of the more important preliminary results from the NASA Pioneer VI and VII interplanetary spacecraft were presented to the American Geophysical Union at its 48th annual meeting last month in Washington, D.C.

The two spacecraft have flown almost 200 million miles in their orbits around the sun and the scientific information returned to earth includes:

- Limits of the earth's protective magnetic envelope, the magnetosphere . . .
- A better definition of the solar atmosphere . . .
- Better data for solar weather forecasts . . .
- Additional information on the solar wind.

A report on the magnetosphere and interplanetary magnetic fields indicates the magnetosphere ends at about 3.5 million miles from earth going away from the sun.

Previous estimates put the limit of the magnetosphere as close as the orbit of the moon, about 240,000 miles or as far out as 100 million miles.

Magnetosphere and interplanetary magnetic field papers and their authors were:

"Preliminary Pioneer VII Observations of the Effect of the Magnetospheric Tail at 1,000 Earth Radii" — Dr. John H. Wolfe, R. W. Silva, and D. D. McKibbin, Ames Research Center, Mountain View, Calif.

"Macrostructure of the Interplanetary Magnetic Field" — Dr. Norman F. Ness and Dr. Leonard F. Burlaga, Goddard Space Flight Center, Greenbelt, Md.

"Microstructure of the Interplanetary Magnetic Field" — Drs. Burlaga and Ness.

The papers are summarized below.

The magnetosphere protects man from high energy solar particles, and is believed to have allowed evolution of higher forms of life on earth. It is not a sphere, but probably looks like a very long, stretched-out teardrop or a thick, tapered knitting needle.

The continuous stream of charged particles flowing out from the sun at around a million miles per hour is known as the solar wind. On the sun side of the earth, these particles strike the earth's magnetic field, creating a shock wave. At this shock front, the solar wind divides and flows around the magnetically protected cavity containing the earth.

Satellites have measured the distance on the sun-side from the earth's surface to this magnetic boundary at about 40,000 miles.

Downwind Wake

Along the line of the earth's orbit, spacecraft have found the stretched-out teardrop of the magnetosphere to have a diameter of around 160,000 miles, and the same diameter has been measured 280,000 miles "downwind" from the earth, 40,000 miles beyond the orbit of the moon.

The course of the Pioneer VII spacecraft, launched last August, was tailored to try to locate the magnetosphere at 3.5 million miles behind or "downwind" from the earth.

Besides defining a basic part of the earth, this knowledge is important to understanding basic particle physics and planetary science.

These Pioneer VII results were given by Dr. John Wolfe, of NASA's Ames Research Center, Pioneer project scientist; and Dr. Norman Ness, NASA's Goddard Space Flight Center.

The Ames Research Center has project management for the Pioneer series of spacecraft.

Based on measurements of the Ames solar wind experiment, Dr. Wolfe says Pioneer VII appears to have found not the true magnetosphere, but the tip of the tail of the magnetosphere and its turbulent wake.

Pioneer VII flew through portions of what appeared to be the tail or wake of the earth's magnetosphere from September 25 to October 1, 1966, at distances ranging from 3,515,181 miles from the earth to 4,196,817 miles. At first encounter with wake phenomena, the solar wind declined to less than 1/100th of its normal strength for several minutes, and afterwards numbers of solar particles fluctuated violently for various periods of time over the next six days.

A preliminary analysis of magnetic field measurements, reported Dr. Ness, indicates that while phenomena at 3.5 million miles are very complex, the magnetic field appears at times to be connected to the earth. They have the proper strength and are aligned with the earth-sun line.

Summarizing all data so far available from Pioneer VII and other spacecraft, Dr. Wolfe says the evidence suggests that the earth's true magnetosphere extends a long distance beyond the moon, ending at around the 3.5-

million-mile mark. It probably varies substantially in length with solar activity. It appears to have a turbulent wake extending an unknown distance beyond.

"Pieces" Slough Off

Two other explanations of the Pioneer VII data are that the earth's field is so weak at 3.5 million miles that solar particles have penetrated the magnetosphere—or "pieces" of the magnetosphere may be breaking off and blowing "downwind".

However, each explanation is consistent with the suggestion that the magnetosphere ends somewhere short of 3.5 million miles.

At first encounter with the wake, Pioneer VII was 99,075 miles above the earth-sun line, and at last encounter was 114,927 miles above this line. Since the solar wind blows out from the sun roughly in straight lines, the wake should be on this line.

However, each time the wake was detected, the solar wind was blowing somewhat upward. This fits the Pioneer VI finding that the solar wind does not blow in exactly straight lines.

Wobbling Wake

Apparently, the spacecraft detected the wake when it was blown upward to the spacecraft. The fact that the wake is blown around in space would also account for intermittent sightings over six days, says Dr. Wolfe.

Detailed reduction of data from the Pioneer VII plasma probe experiment by Dr. Herbert S. Bridge of the Massachusetts Institute of Technology, may add to information on the Magnetosphere.

The trajectory of Pioneer C (Pioneer VIII with successful launch late this year), now being charted, may be planned to come somewhere inside 3.5 million miles, according to Charles F. Hall, Pioneer Project Manager. This would further pin down the end of the earth's magnetosphere.

Summaries of several more papers on Pioneers VI and VII follow.

Cosmic Radiation

"Pioneer VI and VII Observations of Solar Induced Cosmic Radiation"—Dr. R. P. Bukata, Dr. K. P. McCracken, and Dr. U. R. Rao, Southwest Center for Advanced Studies, Dallas, Tex.

The Southwest Center for Advanced Studies detectors on Pioneer VI and VII measure differences in quantities of low energy (less than 100 million electron volts) cosmic ray particles coming from one direction than from another.

The SCAS experimenters then seek to determine how these differences in direction depend on the three-dimensional configuration of the interplanetary medium, and whether they change with time.

Summaries are as follows:

1. During 1966, a quiet year for solar activity, more than 30 cases of cosmic ray particles generated by solar flares were observed. In each case, there was strong trapping of these solar cosmic rays within the inner solar system (inside the orbit of Mars). That is, once thrown off by the sun, these cosmic rays tended to stay in the inner solar system for periods of up to several days. In some cases, time and intensity variations of these cosmic ray particle arrivals at the spacecraft were extremely complicated.

2. As reported previously by SCAS, the solar cosmic ray particles seemed to travel in well-defined streams following the filament structure of the interplanetary magnetic field.

3. Galactic cosmic rays (higher energy particles from outside the solar system) often were reduced in number for varying times. These reductions frequently occurred in 27 days cycles (the time of one solar rotation), and resulted from deflections of these galactic particles away from the inner solar

system by strong but temporary interplanetary magnetic fields.

These strong fields result from a magnetic compression at the boundary where a fast moving mass of the solar wind overtakes a slower mass. Such fast moving masses appear to be generated by hot spots of the solar disc and these magnetic compression regions appear to co-rotate with the sun.

4. Energetic storm particle events also have been observed. These seem to be solar cosmic ray particles originally generated by a solar flare and shunted around the inner solar system for varying periods of time.

These solar storm particles were detected when turbulent solar wind masses passed the spacecraft. These particles come primarily from one direction. They seem to be accelerated to higher energies within the shock fronts caused by collision with wind masses.

'Bow' Shock Wave

"Pioneer VI Observations of Plasma Ion and Electron Eating at the Earth's Bow Shock"—Dr. J. H. Wolfe, R. W. Silva, D. D. McKibbin, Ames Research Center.

"The Interplanetary Solar Wind Electron Characteristics"—Dr. J. H. Wolfe, R. W. Silva, D. D. McKibbin, Ames Research Center.

As it left the earth on December 16, 1965, Pioneer VI passed through the earth's bow shock wave, which is gas in an extremely steady state condition.

The spacecraft made a large number of measurements of ionized particles, electrons, and magnetic fields. These included the first measurements of flow direction in the bow shock, and the first measurements of electron temperatures.

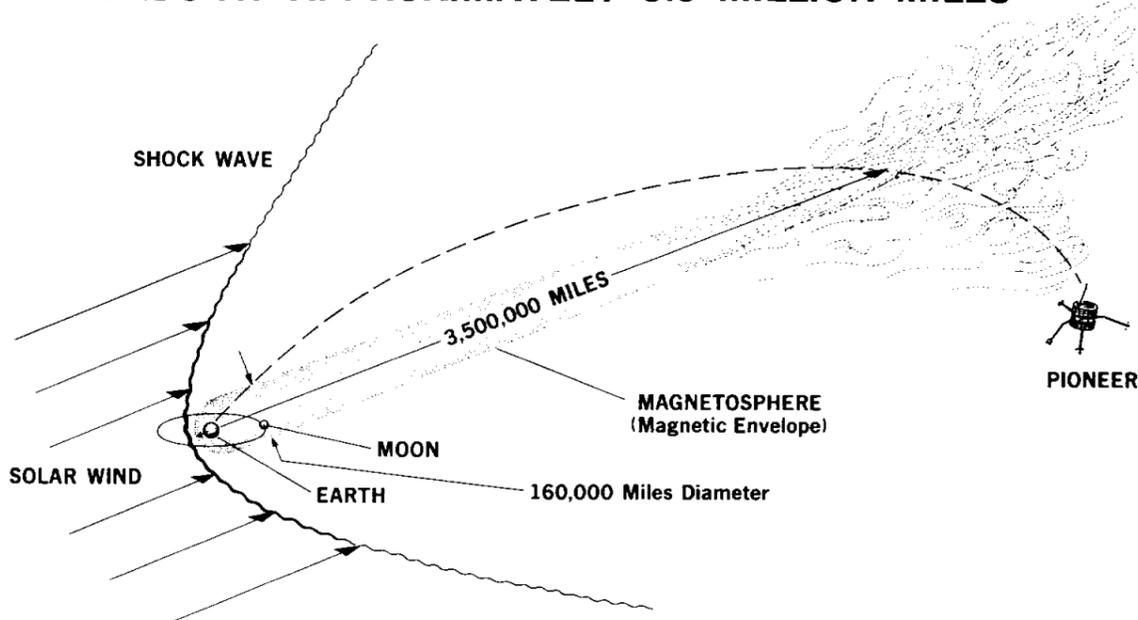
Significant instantaneous changes in flow directions were seen as the spacecraft passed through the shock wave.

Solar wind electrons arriving at the shock wave created by the earth's magnetic field had temperatures of around 100,000°C at the shock wave itself. They then cooled immediately after passing the shock front to about 300,000°C.

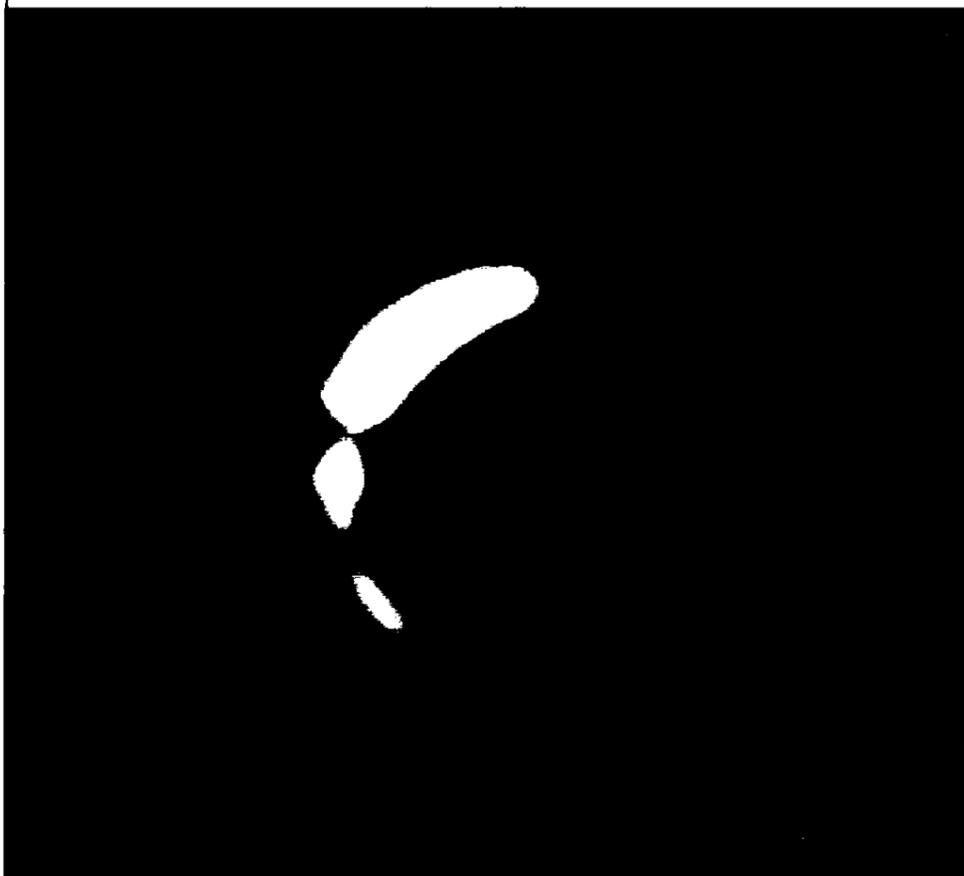
On each side of the boundary of the earth's magnetosphere characteristics of electrons were

(Continued next page)

EARTH'S PROTECTIVE SHEATH, THE MAGNETOSPHERE, ENDS AT APPROXIMATELY 3.5 MILLION MILES



Surveyor III Shows Its Versatility as a Photographer



REVERSE ECLIPSE—Sunrise and sunset are seen simultaneously in this Surveyor III photo of the earth's disc passing across the sun April 24. The sun sets over Asia and the Indian Ocean on the upper left side of the disc, while at lower right sunrise is starting over the southeast Pacific. The photo was made while the earth and sun were 42 minutes into totality. Brightest portion of the lighted ring is the northwest quadrant of the earth as viewed from the moon—the eastern portion of Asia.



MOON MINER—Surveyor III's surface sampler dredged up a couple of cubic inches of lunar soil and dumped it on the white surface of Surveyor's No. 2 footpad. The soil sample was photographed four times, each time through a different color filter to separate the primary colors. By combining filtered shots in an additive process, the actual color of the sample can be reconstructed to conform to the known color values on the color calibration wheel attached to the landing leg.

Earth Magnetosphere

(Continued from preceding page)

found to be almost identical. This is consistent with the idea that solar wind electrons are injected directly into the earth's magnetosphere and then accelerated to high energies by the earth's magnetic field to form the outer Van Allen belt.

Temperatures of electrons in interplanetary space have been measured for the first time by both Pioneers VI and VII along their entire trajectories. These temperatures have proved to be about twice as high as the temperature of the positive particles in the solar wind.

Some theoretical calculations had put the temperature differences between the interplanetary electrons and the ionized particles at far higher values.

Hot Wind

"The Magnetic-Field-Aligned Thermal Anisotropy" R. W. Silva, Dr. J. H. Wolfe, D. D. McKibbin, Ames Research Center.

Temperature is generally defined as the amount of random motion of molecules in a solid or gas. The random motion increases as energy is applied in the form of heat.

In the solar wind, the motions of particles, which correspond to temperature on the earth, are less random. These motions continue random in one direction. However, in a perpendicular direction they are controlled by the shape of the interplanetary magnetic field, which extends out from the Sun in a long spiral.

The reason for this is that particles moving in the direction of the magnetic field are not affected by the field, but all others are.

One result of this is that particle temperature measured in one direction is different than it is when measured at right angles to this direction.

Rapid changes in the interplanetary field are accompanied by immediate changes in the temperature orientation. Spacecraft data based on long term averages have indicated dependence of temperature on direction. However, the measurements by the Pioneer VI and VII solar winds experiments have provided the first direct measurements of this relationship between the thermal properties of the solar wind and the interplanetary field.

This data is important to the basic physics of particles and fields.

Bow Wave Analyzed

"Analysis of the Earth's Bow Shock Under Steady State Conditions"—Dr. C. P. Sonett, Dr. J. H. Wolfe, R. W. Silva and D. S. Colburn—Ames Research Center.

As it left the Earth on December 16, 1965, Pioneer VI passed the earth's bow shock wave and made the most accurate measurements yet taken. The bow shock happened to be in an extremely steady state condition.

The earth's bow shock is the shock wave created in the solar wind when it strikes the earth's magnetic field. This shock wave is believed to form a shallow cone much like a shock wave in front of a supersonic aircraft. The earth's field behaves like an aircraft in a wind tunnel deflecting the solar wind beside and around it.

However, the shock wave in the solar wind is collisionless.

The particles in the solar wind do not strike other particles nor a solid surface and get deflected. Instead, the magnetic field carried by the solar wind particles strikes the magnetic field of the earth. The solar wind field itself is deflected and it in turn deflects the solar wind particles.

Understanding this mechanism is significant in the important new field of magnetohydrodynamics, which is the study of charged electrically conducting fluids in magnetic fields.

Both the magnetic field and solar wind instruments on Pio-

neer VI measured the bow shock.

These precise measurements of an extremely large scale magnetohydrodynamic shock wave under steady conditions confirmed theoretical calculations of shape and behavior of such shock waves.

Earthbound Checkout



VISIBLE AERODYNAMICS—A 90-foot model of the developmental sailwing canopy is towed behind a deuce-and-a-half Army truck at Miller Field on Staten Island. The sailwing configuration is under study by the Landing and Docking Mechanics Branch of Structures and Mechanics Division as a possible device for land landing future generation spacecraft. Barish Associates of New York City builds the sailwing.

Animals Can Harbor Deadly Germs That Endanger the Unprotected

By MSC Safety Office

Rabies and tetanus are two serious illnesses that can be transmitted to man by the bite or scratch of an animal. Any mammal from the tiniest shrew to the largest carnivorous animal can transmit rabies or tetanus by a bite or a scratch, if certain conditions are present.

Tetanus, commonly known as lockjaw, results from the poison released from an organism that thrives on the lack of oxygen. So powerful is this poison that 1/4 teaspoon can kill 100,000 people. It has been proven that these organisms are found in soil samples from nearly everywhere. Many people even harbor these germs in their intestines with no ill effects.

Soil that has been treated with animal fertilizer is likely to be very rich in the germs. Infection can occur through any penetration of the skin from a bite, or a scratch.

Sometimes germs will enter a wound, remain at the site of the entry for weeks, months and

even years before the symptoms appear. Frequently, a tetanus case will show no physical sign of a wound. Normally, the effects of tetanus do not become apparent for five to seven days, though some cases incubate in only a few days.

100 Percent Mortality

Generally the longer the incubation period, the less severe the illness. Estimates indicated that of the three-to five-day incubation periods, 100 per cent die, of the five-to seven-day incubation period, only 10 to 20 per cent can be expected to recover.

There actually is no cure for tetanus once it has entered the nervous system. At this time the treatment is directed towards preventing further damage. Prevention through immunization is the best protection.

It is recommended that every adult should have the standard immunization series; that is, a shot, followed by another shot a month later and a booster a year afterwards. Such immunization

is normally effective for about four years. A child's immunization differs in that an extra shot is administered on the third month and the effectiveness lasts only two years.

Two Types of Rabies

Rabies, alias hydrophobia, is another illness that attacks the nervous system. There are basically two different types of rabies — furious and dumb. These names are derived from the behavior of the infected animal.

In the furious type, the animal will be moody, either desiring to be left alone or extremely friendly. This moodiness is always followed by a period of wandering and irritability in which the animal bites sticks, other animals, people, including even his own master.

The dumb rabies is characterized by drowsiness, disinterest in everything and a limp slack jaw. Frequently animals with both types of rabies will sit over a pan of water or will try to drink by immersing part of its head in the water. These symptoms are certainly only indications that an animal may have rabies.

If it is suspected that a dog, cat or other animal has rabies, take it to a veterinarian immediately for diagnosis.

Shots are Insurance

Precautions should be taken in the form of immunization against tetanus by all people. Rabies shots for all animals are also good insurance, but if an animal is bitten by a suspected animal, it should be confined and treated for at least 30 days whether it has been vaccinated or not.

If a family member is bitten by an animal, the following steps should be taken:

- Identify the animal, by kind, size, color, and place. Teach children to seek the help of a policeman, school guard or an adult as soon as possible.

- Clean the wound thoroughly with warm water and soap for at least fifteen minutes *as soon as possible*. Washing will greatly decrease the chance of contracting rabies.

- See a doctor immediately after washing the wound for a determination of whether or not to start the rabies treatment of 14 consecutive injections.

- Report the incident to the local health officer (in Harris County phone CA 8-8311, or in Houston phone CA 2-9351) and the dog pound (in Houston phone CA 2-9351).

- Have the biting animal quarantined. If it is normal after 10 days, it is probably not infected. The exception to this is the bat which may live for months.

Each year over 600,000 people are bitten in the United States, of these 10 per cent or 60,000 are required to take the 14-injection anti-rabies treatment. The best way to avoid the treatment is to be cautious and stay away from strange domestic or wild animals.

The Roundup is an official publication of the National Aeronautics and Space Administration Manned Spacecraft Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for MSC employees.

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Small Satellite Planned To Map X-Ray Stars

NASA has funded the first flight unit of a new scientific spacecraft project aimed at mapping X-ray stellar sources within and outside our galaxy.

The Small Astronomy Satellite-A (SAS-A), which is planned for launch sometime in 1969 to map stars emitting X-rays, is expected to cost approximately \$9 million.

Primary purpose of the program is to provide a means of collecting valuable data on the celestial radiation sources from above the Earth's atmosphere. Such data could lead to the selection of the more interesting radiation sources which can be studied in detail by more sophisticated spacecraft.

Increased interest in X-ray astronomy has been generated in recent years since celestial

X-ray energy sources were discovered in 1962. Two prime sources of X-ray energy are the Crab Nebulae, the remnant of an exploded star, and the constellation Scorpio. X-ray emissions from Scorpio are at least half as strong as the X-rays emitted from the Sun.

Management of the Small Astronomy Satellite (SAS) program is under NASA's Goddard Space Flight Center, Greenbelt, Md.

SAS-A will measure the position, strength and time variation of all detectable X-ray sources. Later flights could include measurements in the gamma ray, ultraviolet, visible and infrared regions of the spectrum.

The SAS will be launched aboard the four-stage Scout launch vehicle. It will be placed into a nearly circular orbit at an altitude of about 330 statute miles and will circle the globe once every 96 minutes in this orbit.

The basic spacecraft designed for the SAS project is a space platform which would remain essentially the same for each mission. The experiments, carried as an upper section on the spacecraft, can be changed without affecting the spacecraft design.

Total weight of the SAS flight units will be about 330 pounds with a little less than half of this attributed to the experiments. Solar cells and rechargeable storage batteries will supply about 25 watts of power for spacecraft and experiment operation.

The spacecraft will spin at a very low rate of approximately 1/12 rpm so that a band in the sky is swept out each revolution by the field of view of the detectors.

Bernardin Wins Tickets; CU Has Quarterly Audit

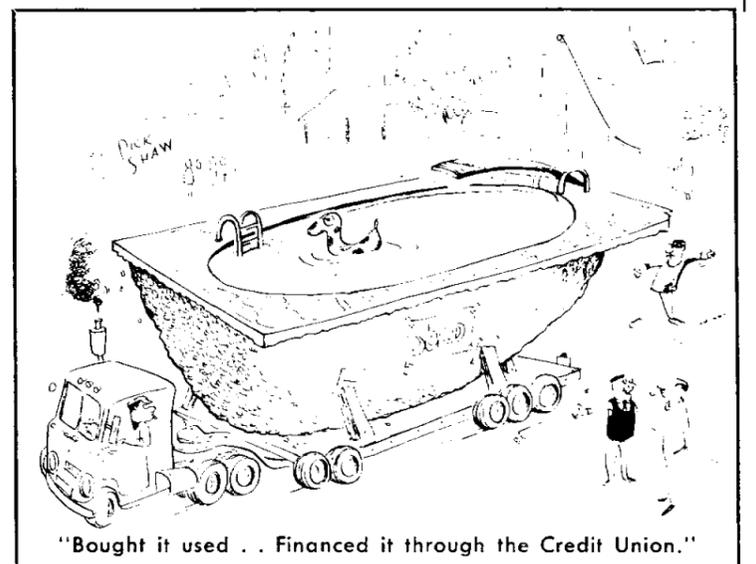
Bob Bernardin of Crew Systems Division won two tickets in the April MSC Federal Credit Union drawing for local entertainment events. Bernardin selected tickets to tonight's Pete Fountain show at the Jones Hall of Performing Arts.

Investing in at least one Credit Union \$5 share a month makes a person eligible for the monthly ticket drawings.

The MSC Federal Credit Union Supervisory Committee has completed its first quarterly audit of the period ending March 31 on accounts E through H, all delinquents and all closed accounts.

Members not having yet received their statement should call committee chairman Bill Hill at 7721.

On the Lighter Side



— Filched from the Lockheed Star

Space News Of Five Years Ago

May 14, 1962—Testimony of February 27 by Prof. James Van Allen before the House Committee on Appropriations on the relative worth of instrumented unmanned satellites versus manned satellites was released. Van Allen was misquoted on the wire news services to the effect that manned space flight was of limited scientific value in the future.

May 17, 1962—NASA postponed MA-7 flight attempt until at least May 22, 1962 because of modification of altitude-sensing instrumentation in the parachute deployment system. MA-7 pilot M. Scott Carpenter was pronounced in "excellent condition" for his orbital flight after a five-hour physical examination.

May 23, 1962—May 24 was declared a safe day from major solar flares for MA-7 launch attempt by the Sacramento Peak Observatory of the Air Force Cambridge Research Laboratories.

May 24, 1962—Aurora 7 with M. Scott Carpenter as pilot launched on MA-7 orbital mission and the fourth US manned space flight. Almost faultless countdown, launch was delayed only briefly by ground fog, and Mercury spacecraft was placed into orbit at 17,532 mph (apogee: 167.4 miles; perigee: 99 miles; period: 88.3 minutes). Carpenter performed series of space science and technical development experiments including visual and photographic observation of star fields and "white particles," consumption of solid foods, release of tethered multi-colored balloon to test sighting, and observation of separated Atlas booster. 81,200-mile flight featured attitude stabilization and control pilotage for completion of three orbits,

and monitoring of control systems fuel for proper retro-fire attitude. Reentry caused landing impact point over 200 miles beyond intended area and beyond radio range of recovery forces. After landing, Carpenter egressed through top of spacecraft and climbed on inflated raft awaiting rescue, to be joined by two USAF paramedics, Airman John Heitsch and Ssgt Ray E. McClure, who inflated Stullken collar to prevent spacecraft from sinking. After three hours on water, Carpenter was picked up by a helicopter from the USS *Intrepid*, and his spacecraft was retrieved by the destroyer *Pierce*. Carpenter was reported in good physical condition and flown to Grand Turk Island in the Bahamas for 48-hour debriefings and medical examinations.

President John F. Kennedy personally congratulated M. Scott Carpenter by telephone shortly after the Aurora 7 pilot arrived by helicopter aboard the carrier *Intrepid*, saying: ". . . I wanted to tell you that we are relieved and very proud of your trip. I am glad that you got picked up in good shape and we want to tell you that we are all for you and send you the very best of luck to you and your wife." Carpenter said: "My apologies for not having aimed a little bit better on re-entry." President Kennedy: "Oh, fine and good. We want to congratulate you and I look forward to seeing you in Washington sometime soon . . ."

May 25, 1962—Velery Lutsky, Soviet astronomer of the Moscow Planetarium, said in English-language Radio Moscow broadcast to North America, that the flight of Aurora 7 made it "more urgent" that the US and USSR cooperate in space exploration.

Roundup Swap-Shop

(Deadline for classified ads is the Friday preceding Roundup publication date. Ads received after the deadline will be run in the next following issue. Send ads in writing to Roundup Editor, AP3. Ads will not be repeated unless requested. Use name and home telephone number.)

FOR SALE/RENT—REAL ESTATE

1 and 1/2-acre sandy, high-ground country lots within sight of MSC, good drainage, reasonable. Mac Owen, 877-1689.

3-bdr 1 1/2-bath brick, 2-car garage, central air/heat, large paneled den, living room, kitchen with dining area, large walk-in closets, 80x120-ft lot, backyard fenced, schoolbus available. Take \$1500 for \$3000 equity; \$110/mo payments include everything. James Weaver, 1506 Webster St., League City, 932-2371.

4-bdr 2-bath in Seabrook Baywood subdiv, living room, dining room, family room, carpets, drapes, central air, dishwasher, disposal, 2-car detached garage, swimming pool, waterfront privilege, fishing pier, boat ramp, on 100x145 lot. C. J. Hall, GR 1-4586 after 5.

120x150 lot in El Lago Estates, trees, fenced three sides. J. C. French, GR 4-2457.

Sell or trade four 135x200-foot lots on North 2nd in LaPorte for late model 12-ft 2-bedroom mobile home. Wilma Wells, GR 1-1512.

3-bdr 2-bath in Seabrook, central air, fireplace, more than 2000 sq feet, fenced, trees, covered patio, six years old. Make offer of \$7,000 equity; balance due \$16,000. Widow wishes to settle estate. L. R. Steinhart, GR 4-3300.

4-bdr 2-bath in Clear Lake City, central air, landscaped, fenced. Equity; \$164/mo. Jack Skinner, HU 8-0519.

2-bdr 1 1/2-bath unfurn duplex studio apartment for rent, garage, patio, water and yard work paid, adults only. \$125/mo. Webb, 932-3618.

3-bdr brick with neighborhood pier privileges, built to withstand Gulf storms, two feet above Carlo's high-water mark. \$13,500, \$1000 down, 6 1/2%. Adjacent 50x95 lot \$1500. W. H. Hooper, GR 1-2823.

379-acre wooded lot in Bayou Crest subdivision, located 3/4 mile west of Gulf Fwy on FM 517, 18-ft elevation bayou property, all subdiv lots sold. Rod Bass, 932-4763.

5-bdr 2 1/2-bath in El Lago, 2-car garage, fireplace, hdwd floors, 1/2-acre corner lot, community pool. Dick Wroble, 877-3306.

3-2-2 brick in Tower Estates, Alvin just off FM 528, 1/2-acre corner lot, central air/heat, school bus at door, \$995 equity, assume loan, \$130/mo. W. G. Johnson, OL 8-5886.

4000-sq ft living area home in Shoreacres, 1/2 block from bay landscaped grounds with swimming pool, sunken living room. Shown by appointment only. Appraised at \$60,000; sell for \$53,000. Mrs. Joseph F. Shea, GR 1-2514.

4-2-2 golfcourse lot in Clear Lake City, separate family and living rooms, landscaped, carpets and drapes. \$22,700. Will take \$3500 for \$4800 equity, assume \$168/mo payments. Dave Brown, HU 8-4022.

FOR SALE—AUTOS

1962 Rambler Classic station wagon 4-door delux 400 series, factory air, reclining bucket seats, headrests, vinyl interior, radio, autotrans. Original owner who ordered it from factory. \$875. Financing can be arranged; consider trade. Floyd Turner, RE 3-7667.

1961 Volkswagen, xclnt mechanical condition, 49,000 miles, one owner. \$600. Jim Peacock, 932-4458.

1958 Cadillac Coupe de Ville, extra clean, new double-duty battery, new tires, (no air). Best offer. Chris Critzos, Kemah 877-3218.

1962 Ford Fairlane, 49,000 miles, green and white, new tires, has sticker and plates, runs perfect. \$500. John Bergeron, 932-2148.

1962 MG Midget, 48,000 miles, Nassau Blue w/black top, has sticker and plates, good condition. \$350. John Bergeron, 932-2148.

1965 Olds 442 Cutlass Holiday, 24,000 miles, autotrans, pwr steering/brakes, air, 345-hp w/4-brl carb, new tires, delux interior, extras, clean. \$2,300. Don Cole, NB 591-4408.

1958 Plymouth station wagon, pwr steering/brakes, autotrans, solid body—no rust. \$150. Virginia Reese, HU 2-1671.

1964 VW Karmann Ghia coupe, clean, one owner, AM/FM radio, pastel blue. \$1295. D. V. Massaro, HU 2-7976 after 5.

1966 Porsche 911, red, 6-cyl engine w/overhead cams, five fwd speed gearbox, Blaupunkt AM radio, has late model 911 options, xclnt condition. Rod Bass, League City 932-4763.

1962 Fiat 1200 red convertible, AM-FM radio, roll-up windows, 30,000 miles, consider trade for pickup. \$695. Clifford Thompson, HU 6-7768.

1961 Volkswagen, xclnt mechanical condition, 50,000 miles, one owner. \$475. Jim Peacock, 932-4458.

1958 Ford Fairlane 500, engine and trans recently rebuilt, good tires, ample rust, xclnt fishing and work transportation. \$125. M. E. Donahoo, Dickinson 534-3279.

1963 Chevy II Nova, new tires, gets 20 mpg. \$750. G. D. Hector, 534-3352.

1961 Olds F-85 4-door, factory air, auto-shift, HD shocks/brakes, AM-FM available, reliable, clean. \$585 or trade down. Jon Farberman, WA 6-7192 late nights.

1961 Corvair 4-door sedan, 700 series, air, autotrans, radio heater, 49,000 miles, clean and economical, one owner. \$333. S. Jacobs, PR 4-9924 after 6:30.

FOR SALE—MISCELLANEOUS

1966 Ducati Motorcycle, 160cc, 70-75 mph, 90 mpg, 1500 actual miles, xclnt condition. Also helmet, tinted bubble, cable lock w/keys tarpaulin \$300 for all. J. M. Walker, RI 8-5910.

Membership in Edgewood Swim Club, 5815 Van Fleet St., (across from K-Mart), family lifetime corporate share \$200, no-interest time payment available, shares may be resold, summer membership \$60 until June 1, No. 2 Olympic pool (82.5x42) with kiddie wading pool, lifeguard and manager, clubhouse facilities. Wil Brugger, MI 5-5287 after 6.

Fender Stratocaster guitar, new paint, 3 pickups, tremolo bar; Princeton reverb amplifier, new condition, has vibrato and reverb pedal, 30-foot cord. Guitar alone \$150; amplifier alone \$100; both \$250. John Bergeron, 932-2148.

Size 10 wedding dress, has been cleaned and is in perfect condition, train detaches from shoulders. Carol Mobley, MI 5-0339.

13-year old Palomino mare, xclnt with kids. Also complete riding outfit. All for \$150. Virginia Reese, HU 2-1671.

9x12 rug and pad, 32x82 aluminum screen door, air conditioner, electric guitar, 38x72 foam mattress, foldable baby carriage, baby gate, baby scale. John Fitzgerald, HU 8-2886.

1966 Honda Super 90, black, xclnt condition, 950 miles. \$275. Duane Kennedy, 932-2760.

1966 Honda Dream touring motorcycle, 150-cc, 2,000 miles showroom condition, two helmets, windshield, mirrors, luggage rack. Cost \$650 new in April 1966; asking \$425 cash. Transferring soon. John Anderson, HU 8-2362.

Walter Hagen golf clubs, four woods, 10 irons, leather bag, new cart, 20 balls. Cost \$270 new; sell for \$90. W. E. Thomas, League City 932-4787.

14-in wheel camper-utility trailer, built like mobile home, alum siding, 2x2 studs, mahogany paneling, 6 ft wide, 8 ft long inside, table, seats makes into two bunks, storage under seats, 12v DC lighting, 110v outlet w/fuse box. Must be seen to be appreciated. Used one weekend. \$600. R. G. Stevenson, HU 7-2746.

Admiral 21-in console TV, suitable for rumpus room, den or second TV for kids. \$25. Terry White, 932-4472.

Large 1/4-in Healthways wetsuit, double Navy worktank, espandon knife, Aqualung w/double-hose regulator, pair large Voit Viking flippers, xclnt condition. All for \$100. Also: English saddle, girth and bridle, xclnt condition. \$120. John S. Llewellyn, Alvin OL 8-4039.

35mm Bell & Howell Canonet QL 2.5 camera, rangefinder, f/2.5 lens, CdS meter w/auto or manual expo settings, two months old—10 months left in guarantee. Lists for \$89.95, sell for \$45. P. H. Kloetzer, 877-3365.

Toy silver poodle available for stud for pick of litter. F. L. Greene, 591-2305.

Gentle 3-year old gelding, xclnt for lady or family use, see to appreciate, almost new hi-quality saddle and bridle. \$275. Bob Handley, HU 2-7041.

Gentle riding mare with beautiful colt, saddle optional. Walter Smith, Alvin OL 8-4957.

AKC registered Shetland sheep dog, female, 20-months old. \$25. Daniel Riegert, MI 5-8445.

38x60 Hamilton drafting table. \$50. Inez Donaway, GR 3-1297.

1965 Super Porpoise sailboat with trailer. \$450. Victor L. Ettredge, 591-2110.

Air conditioner for 57 Olds, used one season. \$65. 1/4-hp pump w/filter unit for 8 to 15-ft dia swimming pool. \$25. Ted White, GR 4-2214.

4x8 pool table, adj legs and bed, cues and balls. \$100. D. Hall, MI 5-1084 after 5:30.

1966 Suzuki 12-cc motorcycle, 70 mph, 550 actual miles, xclnt condition. L. D. Armstrong, HU 8-1532 after 5.

New Climatic Air Royal auto air conditioner, 3-speed blower, manual or auto clutch, temp control with mount and drive kit, compressor, clutch, belt. Fits 1958-62 Ford or Merc V8, complete with installation procedures. \$100. Jim McBarron, 591-3778.

Lowrey electronic organ and bench, walnut, two manuals, eight pedals, Leslie speaker, sell half price—arrange payments, see to appreciate. James Weaver, 1506 Webster St., League City 932-2371.

1966 Cimatti 100-cc Italian motorcycle, 800 miles, Pirelli tires, crash helmet, 67 registration. Cost \$425 in December, sell for \$225. Dinette table with one leaf and four chairs, \$85. Bobbi Ebner, 591-4322.

3-piece bedroom suit, bookcase bed, double dresser w/mirror, 4-dwr chest, box-springs and mattress. \$75. T. J. Dunn, GR 2-7478.

Gulbransen all-transistor organ, walnut, 3 years old, like new—hardly used. Cost \$1600, sell for \$995 cash.

WANTED

Want carpool from Gulfgate to Bldg 4 7:30-4 or 8-4130. Richard Homer, Ext 3421.

Want room in nice home with private bath, or young lady to share apartment with same. Hazel Edge, Ext 3751 (no home phone.)

Want ride from Baccliff to MSC 7:30 to 4. Debby Hetkes, 966-2335.

Want 4-bdr 2-bath 5 1/4% VA mortgage house in Clear Lake City with fenced backyard. Need to move in by August. W. H. Hooper, LaPorte GR 1-2823.

Want to borrow or rent central-theme decorations for MSC EAA Teen Dance at Sylvan Beach in August, consider any suitable theme. Barbara Vickers, Ext 5241.

Want miniature registered male Dachshund at stud for registered miniature red female, pick of litter for fee. J. M. Copeland, 932-2708.

Want 1000-lb capacity used garage-type floor jack. Jon Farberman, WA 6-7192 late nights.

FOUND

Man's grey w/black trim lamb's wool sleeveless sweater, left in MSC training session classroom. May be claimed at BP23, EAFB Bldg 323, Ext 7311.

DIG DEEP FOR FACTS

METHOD IMPROVEMENT.... MANPOWER.... SCRAP REDUCTION
MECHANIZATION.....ORGANIZATIONAL RESTRUCTURING.....

OPERATIONS
IMPROVEMENT
REDUCES COST

Youth Gun Club Forming in Area

A rifle and shotgun range for young people in the MSC area is one of the aims of a newly organized youth gun club. Jim Donnell of the Flight Safety Office is ramrodding the formation of the club.

"As far as we know, this will be the first such club in the United States," Donnell said. "Adults will teach and advise, but overall operation and control of the club will be accomplished by the young people themselves."

Donnell, organization and extension chairman for the Bayshore District of the Boy Scouts, has had wide experience as

course director for rifle and shotgun ranges.

The gun club will be located along Horsepen Bayou, north of Bay Area Boulevard on land made available by Friendswood Development Company and Humble Oil & Refining Company. The site is away from residential areas.

Plans call for club affiliation with the National Rifle Association and membership individually in the NRA.

Organizers of the club will meet tonight at 7:30 pm at the Clear Lake City Recreation Center. Persons interested in helping the club get underway are urged to attend.

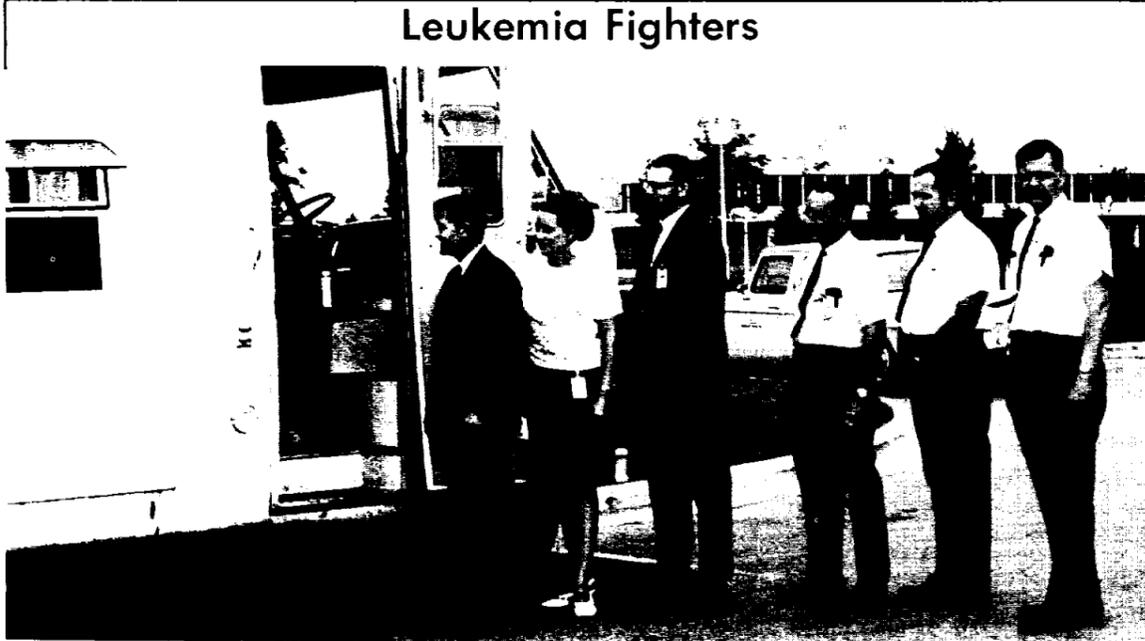
New Gavel Pounder



HANDOVER—The MSC Toastmasters Club April 5 elected officers for the coming year. Shown above at gavel handover ceremonies are Ray Mercado, treasurer; Ernest Gillam, past president standing in for J. P. Harris III, sergeant-at-arms; Maurice Temblay, president elect; William H. Harris, administrative vice president; Richard J. Crane, outgoing president; M. Howard Sands, secretary, and Ronald C. Bake, standing in for J. Haptonstall, educational vice president. MSC Toastmasters meet at 6 pm the first and third Wednesdays each month at the Kings Inn.



Leukemia Fighters



BLOODLETTING—A line of MSC and contractor employees waits apprehensively to donate blood during the April 24-May 2 MSC Blood Deposit Program drive for blood to combat leukemia. But once inside the bloodmobile, they found it only hurts when one laughs, as in the lower photo Martha Scott of ITT watches a bloodmobile nurse affix the needle and catheter. Blood collected above 100-pints during the drive was donated to the Harris County Leukemia Society.

Apollo Crew

costs supplied to your committee last year."

NASA Associate Administrator for Manned Space Flight Dr. George Mueller followed Webb before the Committee with detailed descriptions of changes on Apollo spacecraft design which would be made before the first manned mission lasting up to two weeks is flown.

Combustible materials in the spacecraft and in crew pressure suits would be replaced with teflon, beta cloth and other type of non-combustible materials. "The basic means of controlling fire within the spacecraft," Mueller said, "is through the selection of non-flammable materials where possible, and placement of those flammables which must be carried aboard in such a pattern that any fire which might occur would remain localized and small."

Mueller further relayed to the Committee other changes, such as the repackaging of the Block



Eisele

Cunningham

Schirra

II environmental control system for ease of repair and servicing, and inclusion of a hoze-nozzle system for fighting fires aboard the spacecraft. He said that water-glycol would be retained for ECS coolant fluid and that pressurized spacecraft tests at 16 psi in 100 percent oxygen would be run but with greater procedural safeguards.

Mueller also informed that Committee that a flight-configuration spacecraft would be vibro-acoustically tested at MSC prior to the first manned flight, but that responsibility for prelaunch spacecraft checkout would be shifted from MSC to the Kennedy Space Center to improve KSC-contractor work relationships.

(Continued from page 1)

ROUNDUP

SECOND FRONT PAGE

Dr. Vinson to Address ISA Meeting May 24

The Apollo Section of the Instrument Society of America May 24 will hear an address by Dr. David Vinson, director of the Texas Academy for the Advancement of Life Science.

Dr. Vinson's topic will be "The Man-Machine Interface

... or, Is Man Necessary?" He will make the point that little is known about man's information processing capabilities and efficiencies.



In some functions, says Vinson, man is superior to the machine, and in others the machine is superior. Yet understanding of human information processing will come from instruments, and understanding of machine information processing will come from man. He asks, "What is the justification for the inclusion of fallible man in an otherwise infallible system? Does the machine surpass man in the ability to process information?"

The ISA meeting will be at the Holiday Inn on NASA Road 1, with cocktails at 6:15 pm, dinner (\$3.50/person) at 7:15 and the program at 8. For reservations call HU 8-0900 or HU 8-1270, Ext. 397. Non-ISA members are welcome to attend.

Data Exchange Workshop Held

Representatives of some 160 federal government and private industry organizations will meet in the fifth annual workshop of the Interagency Data Exchange Program (IDEP) May 16-18 at Clear Lake.

The workshop, to be held at the Nassau Bay Motor Hotel across from MSC, will follow the theme "Economy, Reliability, Standardization."

Co-sponsors of the three-day session are General Electric Co. and MSC.

IDEP is a government chartered program designed to provide interchange of test data among government agencies and their contractors to reduce duplicated spending for component testing and to improve system reliability.

The IDEP members are users, rather than manufacturers, of parts and components used in the manufacture of equipment for the Air Force, the Army, the Navy, and NASA.

The workshop's call to order will be at 9 am May 16. The welcoming address will be presented by L. W. Warzecha, manager of the Apollo Support Department of General Electric's MSC Support Operation.

Workshop keynoter will be Dr. B. L. Dorman, assistant administrator for Industry Affairs, NASA.

Other speakers during the course of the workshop include Lt. Gen Thomas P. Garrity, deputy chief of staff of the Air Force Systems and Logistics Headquarters, Capt. H. B. West, director of the Naval Air Systems Command's Propulsion Division, and Col. H. F. Vincent of the Army Materiel Command.

Program chairman is Irving Jurist North American Aviation Inc., Space Division. Chairman of the IDEP Contractor Advisory Board, which sponsors the workshop, is Dallas H. Trent of the Martin Co., Orlando Division.

The workshop, which will include a tour of MSC, is scheduled to adjourn at 4:30 pm, May 18.

Workshop Suit Proposals Sought

MSC has distributed Request for Proposals to the aerospace industry for design, development and fabrication of pressure suits for use on manned orbiting workshops.

The requests—one for intravehicular and the second for extravehicular—call for a suit which shall have the capability of being donned and doffed on a daily basis during a mission of up to one year's duration.

The RFP for the intravehicular suit calls for a garment not to exceed 12 pounds in weight, be comfortable in an unpressurized "shirt-sleeve" environment, permit donning by a crew member and connection to the vehicle environmental control system within five minutes, and meet rigid equipment and system guidelines as specified by NASA.

The extravehicular suit RFP calls for a suit which shall be capable of supporting 30 EVA missions of four hours each occurring in any order over a period of one year and assure maximum protection to the crewman during exposure to free-space environment. Weight on the suit shall not exceed 23 pounds and it must also meet other quality and system requirements spelled out by NASA.

The RFPs were distributed to 15 aerospace firms. Contractor's technical reports are due May 31.